

Traffic-related pollution (NO₂ and CO) and its association with asthma symptoms among 10-11 year old children in Malaysia

ABSTRACT

Introduction: Children attending schools located close to major traffic sources are exposed to higher indoor air pollution levels due to infiltration of outdoor air pollutants. This study investigates the respiratory health of Malaysian schoolchildren in relation to indoor air pollution in schools and at home.

Methods: This cross-sectional study was conducted among 2,164 schoolchildren aged 10-11 years in 35 urban and semi-rural schools in Kuala Lumpur Negeri Sembilan. Parents completed the International Study of Asthma and Allergy in Childhood questionnaire and provided information on the home environment and socio demographic background. Concentrations of NO₂ and CO were measured indoors and outdoors of 14 schools.

Results: The mean (standard deviation (SD)) indoor exposure to concentrations of air pollutants measured in Malaysian schools were: 42.9 (8.77) g/m³ of NO₂ and 3.16 (2.47) ppm of CO in urban schools and 12.4 (8.79) g/m³ of NO₂ and 0.33 (0.18) ppm of CO respectively for semi-rural schools. The prevalence of asthma was significantly higher among urban compared to semi-rural children. Ever wheeze was more common in urban areas (14.3%) compared to semi-rural areas (10.6%) as was current wheeze (urban 9.1%; semi-rural 6.2%), nocturnal cough (urban 12.0%; semi-rural 7.2%) and most other symptoms. The 3 main predictors of nocturnal cough were the presence of a current smoker at home (OR 1.97; 95% CI: 1.31-2.96), the absence of exhaust system in the kitchen (OR 1.67; 95% CI: 1.03-2.68) and the use of air conditioning (OR 3.10; 95% CI: 1.37-5.71). Self-reported asthma was predicted by the occupation of mothers; managerial positions (OR 1.78; 95% CI: 1.21-2.62), mothers working in the armed forces (OR 1.92; 95% CI: 1.32- 2.78) and fathers with a high school level of education (OR 0.46; 95% CI: 0.26- 0.82) while exposure to SHS of ×4 hours per day (OR 2.53; 95% CI: 1.55-4.14) explained approximately 6.0% of the likelihood of reporting doctor-diagnosed asthma.

Conclusion: This study has identified that many Malaysian schoolchildren experience exposure to air pollution indoors that exceeds WHO guidance limits for NO₂ pollution but did not exceed the RMAQG levels. Considering that traffic-related sources largely contribute towards NO₂ concentrations, compliance with the standards is not indicative of the reduced health risks for air pollution exposures.

Keyword: Asthma; Children; Traffic-related exposure